

COMMANDER AIR FORCE
UNITED STATES PACIFIC FLEET
U. S. NAVAL AIR STATION, NORTH ISLAND
SAN DIEGO, CALIFORNIA

IN REPLY REFER TO

FFA-1/ A25

SERIAL NO.

80/ 10600

27 JUN 1956

THIRD ENDORSEMENT on ADDENDUM 1 to HQ & HQS^Q, AirFMFPac AAR ser 2-56 concerning AD-5 BuNo 132397 accident occurring 18 Feb 1956, pilot FARLEY

From: Commander Air Force, Pacific Fleet
To: Chief of Naval Operations (OP-57)
Via: Director, U. S. Naval Aviation Safety Center

Subj: Addendum 1 to Hq&HqS^Q, AirFMFPac AAR ser 2-56 concerning AD-5, 132397, accident occurring 18 Feb 1956, pilot FARLEY

1. Forwarded, concurring in the conclusions and recommendations of the Aircraft Accident Board Addendum Report, and in the remarks contained in subsequent endorsements.

(b) (6)

By direction

Copy to:
BUAER(2)
CINCPACFLT
CMC
CG, FMFPAC
CO, AIRFMFPAC
CO, Hq&HqS^Q, AIRFMFPAC
BAR, El Segundo

ORIGINAL

A, B6

FF13-5
ASO:WIT:jws
A25-1
14 JUN 1956

SECOND ENDORSEMENT on Addendum 1 to Hq&HqSq, AirFMFac AAR Ser 2-56 concerning AD-5, 132397, accident occurring 18 February 1956, pilot FARLEY

From: Commanding General, Aircraft, Fleet Marine Force, Pacific
To: Chief of Naval Operations (OP-57)
Via: (1) Commander Air Force, U. S. Pacific Fleet
 (2) Director, U. S. Naval Aviation Safety Center, Norfolk 11, Va.
Sub j: Addendum 1 to Hq&HqSq, AirFMFac AAR Ser 2-56 concerning AD-5, 132397, accident occurring 18 February 1956, pilot FARLEY

1. Forwarded concurring with the conclusions and recommendations of the Aircraft Accident Board Addendum Report and the endorsement thereto.

D. C. Roberts
D. C. ROBERTS
ACTING

Copy to:
NavAvnSafetyCen (2)
BuAer (2)
CMC
CinCmacFlt
ComAirPac
CG, FMFAC
CO, Hq&HqSq, AirFMFAC
BAR, Douglas Aircraft Corp.
El Segundo, California

15087

15087

2

ORIGINAL

ORIGINAL

3/HR/vlt
A25
5 Jun 1950

FIRST ENDORSEMENT on Addendum #1 to Hq&HqSq, AirFMFPac AAR ser 2-56 concerning AD-5, 132397 accident occurring 18 February 1956, pilot FARLEY

From: Commanding Officer, Headquarters and Headquarters Squadron, Aircraft, Fleet Marine Force, Pacific
To: Chief of Naval Operations (OP 57)
Via: (1) Commanding General, Aircraft, Fleet Marine Force, Pacific
 (2) Commander, Air Force, Pacific Fleet
 (3) U. S. Naval Aviation Safety Activity, NAS, Norfolk 11, Va.

Subj: Addendum to Hq&HqSq, AirFMFPac AAR ser 2-56 concerning AD-5, 132397, accident occurring 18 February 1956, pilot FARLEY

1. Forwarded, concurring with the conclusions and recommendations. Enclosure (1) is considered fully self explanatory.
2. Enclosure (2) may be interpreted as possible reason for no bailout by the pilot. Similar inaction by the passenger however tends to void this explanation.
3. Emergency procedures are and will continue to be stressed at briefings and safety meetings within this squadron.

H. Roberts
H. ROBERTS

Copies to:
NavAvnSafAct (Direct) (2)
BuAer (Direct) (2)
CMC (Direct)
CinCPacFlt (Direct)
ComAirPac (Direct)
CG, AirFMFPac (Direct)
CG, FMFPac (Direct)
BAR, Douglas Aircraft
El Segundo, Calif (Direct)
F-I-L-E

3

ORIGINAL

ADDENDUM #1 to Eq&HqSq, AirFMFPac AAR ser 2-56 concerning AD-5, 132397
accident occurring 18 February 1956, pilot FARLEY

- Enclos: (1) Letter from CO, U. S. Naval Air Station, North Island, San Diego, California, transmitting the Disassembly and Inspection Report on R3350-26WA engine Ser: #C-590129
(2) Report of Medical Officers investigation into Lieutenant FARLEY's health background

31. THE INVESTIGATION:

The following is a continuation of paragraph 31, THE INVESTIGATION, of subject AAR.

r. Delete paragraph q(4).

s. Enclosure (1) to this addendum establishes number (9) cylinder failure. The cause of the failure was not determined. The cylinder failed in such a manner as to produce the smoke and flame reported by witnesses enclosures (2), (3), (5), (8) and (9), and to cause the manner of burning on the parts as outlined above in paragraph 31;(6).

32. ANALYSIS:

This analysis supercedes the analysis submitted in the AAR. From the general distribution pattern of the wreckage, the heading of the aircraft when found, and the heading reported by the witnesses while the aircraft was in flight, it is determined that the aircraft was in a spin when it struck the ground. Whether the spin resulted from an attempt to stretch the glide to the Borrego Springs County Airport, approximately five miles distant, in the direction of flight, or whether it was caused by an accelerated stall is unknown.

The Disassembly and Inspection Report, statements of witnesses and the condition of parts believed burned in the air indicate that the fire broke out just prior to impact. The fact that no attempt to abandon the aircraft was made, the engine control settings and the statement of witnesses indicate that the pilot was following emergency procedures for a rough running engine and not procedure for fire in the air. The sequence of failure of the number (9) cylinder would produce indications of a rough running engine. As the failure progressed to the probable holing of the cylinder wall, fumes would be emitted from the under side of the engine which were ignited just prior to impact. The board originally considered the possibility that due to the previous history of back trouble the pilot had made up his mind not to abandon any aircraft except in extreme emergency thus accounting for the fact that no attempt was made to abandon the aircraft. However it now appears that this was not a factor since fire did not occur until immediately prior to or after the aircraft entered the spin. The pilot probably believed that he had only a rough running engine and was attempting to reach Borrego Springs County Airport.

4/JAD/1rd
A25

55. CONCLUSIONS AND RECOMMENDATIONS:

a. CONCLUSIONS:

(1) It is concluded that the primary cause of this accident was material failure of the number (9) cylinder. The cause of this failure has not been determined.

(2) A contributory cause of the accident was error of technique on the part of the pilot in that he permitted the aircraft to stall. It has not been determined whether this was a normal stall due to loss of airspeed or an accelerated stall due to abrupt recovery from a dive.

b. RECOMMENDATIONS:

Notwithstanding his experience in type aircraft, this accident appears to have been caused by the pilot's inability to cope with this emergency. It is therefore recommended that emergency procedures be regularly and continually stressed in order that normal good judgement and techniques used be reflexively accurate and remain uppermost over any tendency to panic on the part of pilots and crewmen in abnormal situations.

(b) (6)

[REDACTED] Lt. (MC) USN
Flight Surgeon (Member)

(b) (6)

[REDACTED] USMC
Maintenance Officer (Member)

(b) (6)

[REDACTED] Major, USMC
Flight Officer (Member)

(b) (6)

[REDACTED] Major, USMC
Flight Officer (Senior Member)

U. S. NAVAL AIR STATION
NORTH ISLAND
SAN DIEGO 35, CALIFORNIA

In Reply Refer To:
OCavpd
Ser 7030-810

APR 11 1956

From: Commanding Officer, U. S. Naval Air Station, North Island, San Diego 35, California

To: Commanding Officer, Headquarters and Headquarters Squadron, Aircraft, FMF Pacific, Marine Corps Air Station, El Toro (Santa Ana), California

Subj: R3350-26WA engine, serial No. C-590129: investigation of

Ref: (a) HEDRON AIRFMFFAC msg 211805Z Feb 1956
(b) H&HS, AIRFMFPAC AAR 2-56 of 18 Feb 1956

Enclo: (1) NAS, North Island Engine Disassembly and Inspection Report on R3350-26WA engine, serial No. C-590129

1. Reference (a) requested a priority disassembly and inspection of R3350-26WA engine, serial No. C-590129 and propeller No. 49788. Enclosure (1) reports the results of the inspection which indicates failure of the No. 8 piston.

2. From a review of reference (b) and enclosure (1) the following is considered possible:

a. The No. 9 cylinder exhaust manifold is located at approximately the 4:30 o'clock position on the right side of the aircraft. This location would be visible to all witnesses of reference (b) only when the aircraft was at altitude in near level flight or inclined at an angle no greater than an approach to the farthest witness. Under these conditions, witnesses statements of enclosures (2) and (3) of reference (b) indicate a vapor trail was visible, and enclosures (5) and (9) of reference (b) indicate white smoke was visible.

b. When the aircraft was in its final dive attitude, the 4:30 o'clock position on the right side would be visible only to the witnesses of enclosures (2) and (3) of reference (b) who observed flames in the engine and cockpit when the aircraft was approximately 400-500 feet above the ground.

c. Items Nos. 19, 20, and 21 of the identification list of reference (b), all of which are located on the right inboard side of the aircraft, are listed as having been burned. Item No. 22 indicates that the entire inboard area of the right wing leading edge was burned.

d. Subparagraph (g), under conclusions of enclosure (1), indicates the possibility of a fire existing in the 4:30 o'clock position cowl flap area.

OO:vpd
Ser 7050-816

Subj: R5350-26WA engine, serial No. C-590129; investigation of

e. Although the exact time of initial piston failure relative to the aircraft accident could not be accurately determined, as reported by subparagraph (e) under conclusions of enclosure (1), an approximate lapsed time of one minute or more to transport particles from the No. 9 piston area to the rear crankpin is estimated.

3. In summation, the No. 9 piston apparently failed causing bluish white smoke and ultimate fire to issue from the cowl flap in the 1:30 o'clock position while the aircraft was in flight. This would account for the burned condition of aircraft parts located aft of the cowl flap area, the observations reported by the witnesses, any difficulties experienced by the pilot, and the ultimate aircraft accident.

(b) (6)



By direction

Copy to:

BUAER (with enc1 (1))
AIRFMFPAC (with enc1 (1))
COMAIRPAC (with enc1 (1))
NAVAIRFACT (with enc1 (1))
SAK, Woodridge (with enc1 (1))
WTF (3F-57) (with enc1 (1))

ENCLOSURE (1)

2

?

Station OC:je 7030
NAS NI SD

Operating Activity
HEDRON AIRPMFPAC

Engine Serial No. C-590129
Engine Model R5350-26WA

OVERHAUL ACTIVITY DISASSEMBLY & INSPECTION REPORT NAVFAR-2491 REV. 10-51 AFM-A-1
No. Overhauls : Hrs Since Last O/H Total Hrs Submitted(No.&Date) Yellow Cross
0 0 226.9 HEDRON AIRPMFPAC AAR 2-56

Reason For Investigation

To determine if engine contributed to A/C AD-5 accident sustained 18 Feb. 1956

DISCREPANCIES FOUND AND CONCLUSIONS AS TO CAUSE OF FAILURE
(If more space is required use reverse side)

- Enclos:
- (1) NAS NORIS photo NP(11) 49509L
 - (2) " " " NP(11) 49515L
 - (3) " " " NP(11) 49513L
 - (4) " " " NP(11) 49511L
 - (5) " " " NP(11) 49510L
 - (6) " " " NP(11) 49512L
 - (7) " " " NP(11) 49514L
 - (8) " " Material Test Report No. 15687 of 3/13/56
 - (9) " " " " " 15689 of 3/14/56
 - (10) " " photo NP(11) 49572L

Discrepancies: (a) The engine was received on a pallet and consisted of that portion of the engine extending forward of the front portion of the supercharger front housing and included the propeller hub and related mechanisms and two propeller blades. The pallet also contained a box of bits and pieces. All parts exhibited terrific impact damage and fire damage.

(b) Removal of the Nos. 3 and 4 propeller blades disclosed that chafing and indentations on the blade gears which resulted from impact with the hub indicate that the propeller pitch was approximately 43° at the time of impact. This 43° pitch setting is approximately 15° above the low pitch setting and indicates that the propeller was governing at the time of impact.

(c) Removal of the number 9 cylinder head shown in enclosure (1) disclosed a portion of the number 9 piston and the piston pin strap end of the No. 9 articulating rod as shown in the top view of enclosure (4). A large area on the anti visible side of the portion of piston exhibited markings suggestive of a shaving action as shown in enclosure (10). The shaved area had a scalloped appearance as shown.

(d) The front and rear main crankcase section oil drain tube and bow assemblies and the front oil pump and sump strainer assembly contained metal particles as shown in enclosure (2).

(e) The metal particles shown in enclosure (3) were found in the rear oil drain tube approximately 10 inches from the elbow end.

(f) The rear crankcase main section contained:

(1) A portion of the No. 9 piston, a segment of the No. 9 articulating rod and the No. 9 piston pin as shown in the bottom view of enclosure (4).

(2) Portions of the crankcase main section oil distributing ring part No. 135519N1 and the No. 7 knuckle pin retaining bolt, part No. 130153, which was missing from its functional position in the rear master connecting rod assembly.

(g) Metal particles were adhering to and were impregnated in the bearing surface of the rear balanceweight sleeve, part No. 126461, as shown in enclosure (6).

(h) The metal particles shown in enclosure (7) were found in a sample removed from the crankshaft rear crankpin.

(i) Some metal particles were rounded from extensive tumbling as shown in enclosures (2), (4) and (8) while others exhibited contours and markings of a shaving action as shown in enclosure (10).

8

(j) Enclosure (8) is the results of a spectrochemical analysis of the No. 9 piston, the rear oil distributing ring, a shaving from the rear oil drain tube and a particle removed from the front oil strainer. From this analysis it is apparent that particles from the oil distributing ring entered the front strainer and shavings from the No. 9 piston entered the rear oil drain tube.

(k) Enclosure (9) contains the results of a quantitative analysis of metal particles which were removed from the rear balanceweight sleeve shown in enclosure (6) and metal particles shown in enclosure (7) which were removed from the crankshaft rear crankpin. These particles were identified as aluminum alloy material and are suspected to have resulted from the No. 9 piston failure.

Conclusions: (a) The propeller was governing at the time of aircraft accident.
(b) Initially the No. 9 piston apparently failed in such a manner as to cause aluminum shavings to be deposited in the scavenge oil system, some of which were transported via the external oil system back into the engine pressure oil system where they were deposited in the rear crankpin and on the bearing surface of the rear balanceweight sleeve.

(c) Ultimately the No. 9 piston separated, the piston pin dislodged and the articulating rod separated. The order of this phase of the failure was not determined.

(d) The No. 9 piston, piston pin and rod failure apparently caused multiple damage in the rear crankcase main section as evidenced by the distributing ring condition and the No. 7 knuckle pin retainer bolt condition.

(e) The tumbled appearance exhibited by some of the metal particles, and the presence of other particles in the rear crankpin and balance weight sleeve bearing, indicates that engine failure existed prior to the aircraft accident.

(f) Cause of the initial failure of the No. 9 piston was not determined. However, from the appearance of the shaved and scalloped area of the piston, it is suspected that ladder cracking and possible partial separation of the No. 9 cylinder barrel may have contributed to the No. 9 piston failure. The severity of impact damage to the cylinder barrel precluded a metallurgical examination.

(g) Early phases of the No. 9 piston failure probably caused oil injection into the combustion chamber resulting in puffs of bluish white smoke which would issue from the cowl flaps at about 4:30 o'clock position. As the failure progressed with possible holing of the cylinder wall, increasing quantities of oil would tend to drown the spark plugs but could ignite when coming in contact with hot exhaust manifold and issue from the right side cowl flap area as bluish white smoke.

NOTE: Visual examination of available bearings disclosed no failures from lack of lubrication nor alarming scoring from foreign objects.

Recommendations: None

Signature (Reporting Officer)

(b) (6)

Date of Report Type A/C Removed From
AD-5

MATERIAL TEST REPORT
LIND NAS-SD 369 (Rev 6-49)

C O P Y

TO: Aeronautical Engineering Group, Shop 300, Bldg. 94

FROM: Material and Process Laboratory
Test Requested By:

Mr. (b) (6)

Date Requested

Examination Of:

3/2/56

Metal particles removed from rear crankcase oil drain tube and
Samples Received: front strainer of AD-5, R3350-26WA, Ser. No. C-590129

One piston, one rear oil distributing ring, one rear crankcase
oil drain tube, and one front strainer. All samples removed
from subject engine.

Test:

Spectrochemical Analysis:

	Copper	Magnesium	Silicon	Nickel*	Aluminum Alloy Type
Piston	3.7	.59	-	Positive	18S
Rear Oil Distrib. Ring	1.0	.46	4.5	-	355
Particles from rear Crank. case oil drain tube	(1) 3.6	.55	-	Positive	18S
	(2) 3.9	.57	-	Positive	18S
	(3) .94	.43	4.1	-	355
Particles from Front Strainer	.98	.46	4.1	-	355

* Semi-quantitative Analysis

Comments:

10

Report By

(b) (6)

Chemist

Date Reported

3/13/56

Test No.

15687

Approved By

(b) (6)

Dept., Material and Process Division

Date Approved

Mr. (b)

AVY DPTO 1100 (100-1000)

MATERIAL TEST REPORT
11ND NAS-SD 369 (Rev 6-49)

C O P Y

TO: Aeronautical Engineering Group, Shop 300, Bldg. 94

FROM: Material and Process Laboratory

Test Requested By:

Mr. (b) (6)

Date Requested

3/2/56

Examination of:

Metal particles embedded on rear balance weight sleeve and oil sludge sample removed from rear crankpin of AD-5, R3350-26WA engine Ser. No. C-590129

Samples Received:

One subject rear balance weight sleeve and 25 grams of subject oil sludge sample

Test:

Qualitative Chemical Analysis:

The metal particles embedded on the rear balance weight sleeve are identified as aluminum alloy. The 0.01 grams of metal particles extracted from the subject oil sludge are also identified as aluminum alloy.

Comments:

11

Report By (b) (6) Date Reported 5/14/56 Test No. 15689
Approved By (b) (6) Supt., Materials and Process Division Date Approved
DRAFTED BY DPMO 11ND NAS DATED 11/10/56

ADDENDUM TO AIRCRAFT ACCIDENT REPORT
FARLEY, ROBERT C. 1st Lt., USMC

On examination of Lt. FARLEY's health record, attention is called to at least four entries noted on his "Flight Log" concerning a recurrent painful back condition. On 21 November 1954, he was granted flight permission for one night for "Acute Muscle Strain". On 10 May 1955, he was seen for "Back Trouble", an X-ray taken, and treatment given. On this occasion, a blood count and rectal prostatic examination were performed. The prostate was considered negative, the blood count was unreported. On June 1955, he was granted flight clearance and X-rays taken for a "Stiff Neck" following "long and strenuous flying, several days".

On 12 September 1955, Lt. FARLEY was seen at a dispensary in Korea for "Low Back Pain". Pain at this time radiated down the back of both thighs and was slightly intensified by coughing. Response was prompt to bed-boards, heat and salicylates. The Medical Officer who saw him at this time and who was rather closely associated with him is presently stationed at El Toro. Dr. [redacted] (b) (6) states that his impression of Lt. FARLEY's back was that of "decompensation in the lower back of a tall, rangy person", rather than demonstrable musculo-skeletal disease or abnormality. X-rays he felt, substantiated this conclusion.

More noteworthy information came from two of FARLEY's colleagues who are in Korea who are presently also at El Toro. On at least one or more occasions he required physical assistance from his own member on entering and leaving his aircraft because of pain and stiffness in his back. These same individuals assured me that this condition had an obvious effect on Lt. FARLEY's ability to control his aircraft, their separate opinions being that he was a very competent and well motivated aviator.

No evidence of any such condition was recorded on a Promotion Physical Examination performed on 14 March 1955, nor was such a condition noted or complained of since his arrival at this activity.

Respectfully submitted,

(b) (6)

(b) (6)

[redacted] Lt.(MC) USNR



NO. 9 CYLINDER HEAD
K3350-268A ENGINE
SERIAL NO. C-5900129
ENCLOSURE (1)



REO-CASE-OIL MAIN TUE
SERIAL NUMBER
EXCLUSE (S)

RECORDED BY (5)
SERIAL NO. C-500120
REFUGEE-2000 PROGRAM
REFUGEE-2000 PROGRAM
NUMBER OF PICTURE: 510





Waukesha Aircraft
Oil Pump and Particles of Metal
Oil Distributing Pipe
Kodak-Kodacolor Film
Serial No. C-500129
Enclosure (5)



141

ALUMINUM PARTICLES FOUND IN
OIL AND SLUDGE SAMPLE
REMOVED FROM REAR CHAMBER
GE50-2MM ENGINE
SERIAL NO. 5-590129
ENCLOSURE (1)



NO. 9 PISTON
S100-2000 ENGINE
SERIAL NO. 6-100129
EXCLUDED (10) 29

ADDENDUM TO AIRCRAFT ACCIDENT REPORT
FARLEY, ROBERT C. 1st Lt., U.S.M.C.

On examination of Lt. Farley health record attention is called to at least four entries noted on his H-10 concerning a recurrent painful back condition. On 21 November, 1954 he was treated after admission for one night for "Acute Muscle Strain". On 10 May, 1955 he was seen for "Back Trouble", an X-ray taken, and treatment given. On this occasion a blood count and rectal prostatic examination were performed. The prostate was considered negative, the blood count was un-reported. 11 June, 1955: he was treated and X-rays taken for a "Stiff Neck" following "cough and wheezing for several days".

On 12 September, 1955 Lt. Farley was seen in K-3 Dispensary in Korea for "Low Back Pain". Pain at this time radiated down the back of both thighs and was acutely intensified by coughing. Response was prompt on bed-boards, heat, and salicylates. The Medical Officer who saw him at this time and who was rather closely associated with him is presently stationed at El Toro. Dr. (b) (6) states that his impression of Lt. Farley's back was that of "decompensation in the lower back of a tall rangy person" rather than any demonstrable musculo-skeletal disease or abnormality. X-rays, he felt, substantiated this conclusion.

More noteworthy information came from two of Farley's squadron mates in Korea who are presently also at El Toro. On at least one or more occasions he required physical assistance from his crew member on entering and leaving his aircraft because of pain and stiffness in his back. These same individuals assured me that this condition had no obvious effect on Lt. Farley's ability to control his aircraft; their separate opinions being that he was a very competent and well-motivated aviator.

No evidence of any such condition was recorded on a Promotion Physical Examination performed on 14 March, 1955, nor was such a condition noted or complained of since his arrival at this activity.

Respectfully submitted

(b) (6)

(b) (6)

Lt. (MC) USMC

21 Feb 1956

3/6
IBM

COMMANDER AIR FORCE
UNITED STATES PACIFIC FLEET
U. S. NAVAL AIR STATION, NORTH ISLAND
SAN DIEGO, CALIFORNIA

IN REPLY REFER TO

FF41 A25

SERIAL NO

80/ 5374

9 MAR 1956

THIRD ENDORSEMENT on HQAHQSq, AIRFMFPAC AAR ser 2-56 concerning AD-5 BuNo 132397 accident occurring 18 February 1956, pilot FARLEY

From: Commander Air Force, Pacific Fleet
To: Chief of Naval Operations (OP-57)
Via: Director, U. S. Naval Aviation Safety Center

Subj: HQAHQSq, AIRFMFPAC aircraft accident occurring 18 February 1956

1. Forwarded. Comments are withheld pending receipt of the addendum.

(b) (6)



By direction

Copy to:
BUAAB (2)
CINCPACFLT
CMC
CG, FMFPAC
CG, AIRFMFPAC
CO, HQAHQSq, AIRFMFPAC
BAR, EL SEGUNDO

ORIGINAL

PP13-5
ASO:DCR:jrc
A25-1
17 MAR 1956

SECOND ENDORSEMENT on HQ&HQ Sq, Air FMFPac AAR Ser 2-56 concerning AD-5,
132397, accident occurring 18 February 1956, pilot
FAHLEY

From: Commanding General, Aircraft, Fleet Marine Force, Pacific
To: Chief of Naval Operations (Op-57)
Via: (1) Commander Air Force, U. S. Pacific Fleet
 (2) Director, U. S. Naval Aviation Safety Center, Norfolk 11, Va.
Subj: Master Aircraft Accident Report, case of First Lieutenant Robert
G. FAHLEY (b) (6) USMCR (A)

1. Forwarded.
2. It is expected that the addendum correlating all facts of the investigation will be completed prior to 30 March 1956. Further comment is with-held pending receipt of the above addendum.
3. The best estimate of the dollar cost of the aircraft lost which should have been entered in item eleven (11) on the form is \$458,000.

Clayton C. Jerome
CLAYTON C. JEROME

Copy to:
NavAvSafetyCen (2)
BuAer (2)
CMC
CinCPacFlt
ComAirPac
C3, FMFPac
CO, H&HS AirFMFPac
BAR, Douglas Aircraft
El Segundo, Calif.

23

ORIGINAL

ORIGINAL

3/MR/vit
A25
1 March 1956

FIRST ENDORSEMENT on Hq&HQ Sq, AirFMFPac AAR 2-56 concerning AD-5, 132397, accident occurring 18Feb56, pilot FARLEY

From: Commanding Officer, Headquarters and Headquarters Squadron, Aircraft, Fleet Marine Force, Pacific
To: Chief of Naval Operations (OP-57)
Via: (1) Commanding General, Aircraft, Fleet Marine Force, Pacific
 (2) Commander, Air Force, Pacific Fleet
 (3) U. S. Naval Aviation Safety Activity, NAS, Norfolk 11, Va.
Subj: Major Aircraft Accident Report, case of First Lieutenant Robert C. FARLEY (b) (6) USMCR

1. Forwarded, concurring with the analysis and conclusions of the board, except as follows:

a. From the standpoint of probable experience, witness Nichols would seem to offer the most creditable testimony, especially in view of his most proximate observation point. The fact that he observed smoke to come from the aircraft and this observation was corroborated by witnesses 3, 5, 7 and 9 while 8 saw flames, would serve to establish the probability of a fire in the aircraft. Because of his flying experience, it seems unlikely that witness Nichols would be mistaken about observing the aircraft go into a left slip -- the reason for such a maneuver may well have been because of fire, while anticipating a level ground forced landing.

b. The substance of paragraph (a) above is conjecture but is placed in this endorsement to establish a reason for the progressive stall, which it is believed occurred while in the left slip referred to by witness Nichols. The balance of the analysis and conclusions given are concurred with.

2. The addendum report referred to in paragraph 33 (a) (2) will be submitted irrespective of findings. In addition, this addendum will include a medical chronology recapitulation on Lieutenant FARLEY because of the general interest which the board took in it and because it may furnish specific association of reasons for this accident somewhere within the chain of command. It is the desire of the board that this addendum (medical) be submitted.

3. This command will not demonstrate slips in high speed dives to all newly received pilots, but will cover it in briefings and will continue to completely cover both by written examinations and lectures, the accelerated stall and stalling characteristics of this aircraft.

J. Rogers
J. Rogers
M. ROBERTS

Copies to:
NavAvnSafAct (2) (Direct)
BuAir (2) (Direct)
CMC (Direct)
CinCPacFlt (Direct)
ComAirPac (Direct)
CG, FMFPac (Direct)
CG, AIRFMFPac (Direct)
MM, Douglas Aircraft
El Segundo, Calif (Direct)
P-I-L-E

24

ORIGINAL

29. THE ACCIDENT:

On 18 February 1956 at 0844 PST 1st Lt. R. O. FARLEY, (b) (6) USMCR, departed from USMCAS, El Toro (Santa Ana), California on a routine proficiency and training flight to be conducted under VFR conditions in the El Toro local flight training area. His estimated time of return was 1215 PST. At 1315 PST the squadron duty section telephone watch called the station control tower and asked for the ETA on the aircraft. At 1320 the control tower duty watch called and notified him that the aircraft had crashed at Borrego Springs, California. The time of the accident was later determined to be at approximately 1120 PST. Lt. FARLEY, and his passenger, PFC BUTTS were fatally injured.

30. DAMAGE TO AIRCRAFT:

a. From examining the impact area it seems that the aircraft made contact with the ground at a steep angle of descent on the right wing while on a southerly heading shearing most of the right wing and external right fuel tank. The aircraft seems to have pivoted on this wing around to a heading of approximately 240° where the engine contacted the ground. The fuselage apparently broke off at the firewall and continued on over the engine for approximately 15 feet where it struck the ground nose down and right side down and exploded scattering parts over a circular area of approximately 400 feet. The instruments recovered from the hole the fuselage made indicate an impact force from the right forward quarter of the aircraft. Most of the recognizable right side parts indicate this force, whereas the left side parts and recognizable parts from the bottom of the aircraft seem to have been thrown away from the aircraft on impact or blown away by the explosion that followed.

b. The engine and propeller were shipped to the C&R Department, NAF, North Island for inspection, disassembly, and analysis. The remainder of the wreckage was taken to NAF, El Centro for disposition.

31. THE INVESTIGATION:

a. Lt. FARLEY was an experienced AD pilot who had complied with all local requirements pertinent to participation in flight operations from this airfield.

b. Lt. FARLEY was given medical clearance to control aircraft in flight on 10 February 1956.

c. Lt. FARLEY was authorized to perform the assigned flight.

d. The aircraft had been preflighted and serviced by qualified maintenance personnel just prior to Lt. FARLEY'S flight.

e. The aircraft had been flown on the preceding day by two pilots of this squadron for a total of 4.5 hours with no discrepancies. The last pilot to fly the aircraft on the preceding day has given his statement, enclosure number 12.

f. The flight was cleared to be conducted under VFR conditions in the local training area for an estimated 3 hours and 45 minutes. The aircraft crashed well within the local operating area approximately 2 hours and 38 minutes after take-off.

g. The dive brake in this aircraft had been rendered inoperable by the maintenance department. The pilot was told of this during his check-out procedures in this squadron.

h. By careful measurement of the stabilizer trim jack screw, and comparison with other aircraft of this type it was determined that the stabilizer was trimmed for 1 unit (approximately 2 10) nose down. According to the pilots handbook this is near the setting of $\frac{1}{2}$ units (4 0) recommended for a clean dive.

i. The following instrument readings were obtained from the readable instruments recovered:

(1) Main fuel cell quantity	1600 pounds
(2) Master gyro compass	240 degrees
(3) Tachometer	2750 RPM
(4) Cylinder head temperature	175 degrees centigrade
(5) Rate of descent	6000 FPM

j. The following settings were obtained from the engine control quadrant:

(1) Mixture control	Rich
(2) Propeller control	Full low pitch
(3) Throttle control	Idle
(4) Supercharger control	Low stage

k. The engine ignition switch on "Both".

l. The landing gear shock struts and actuating cylinders were examined and showed that the landing gear was in the up position.

m. The cockpit canopy actuating cylinders were examined and showed that the canopy was closed.

n. The left wing flap actuating cylinder was examined and showed that the wing flap was up. The right flap actuating cylinder was not found. However it can reasonably be assumed that it was up also because of the balance valve and linkage in the flap system.

o. The safety belt and shoulder harness buckles and fittings were found in the wreckage and showed that both occupants had them on and locked.

p. The Airframe:

(1) The outer panel of the left wing was found inverted in relatively good condition, bearing 190° at a distance of 125 feet. The top of the wing was moderately damaged whereas the bottom was in good condition.

(2) The left wing tip was found bearing 220° at a distance of 125 feet in very good condition. The joint appeared to have been wrenching clean and was only slightly bent.

(3) The oil cooler scoop fairing was found bearing 170°, in very good condition, at a distance of 150 feet.

(4) The left elevator was found bearing 0100 at a distance of 50 feet and was bent down to an angle of about 10° in the middle top section.

(5) A thorough search was made of the area along the flight path, back to the crest of the hills for the part or parts reportedly lost in flight. This search was on foot and by helicopter. No aircraft parts were found.

(6) The right inboard wing flap was found bearing 2500 at a distance of 100 feet. The walkway on the upper side was badly burned and the leading edge was crushed. The fuselage area just adjacent to this on the lower right side showed signs of intense heat as did a portion of the inboard leading edge of the right wing.

(7) The left stabilizer was found 15 feet to the west of the wreckage, as was the vertical fin and rudder. These parts were all badly smashed along the leading edges and badly burned from the fire that followed the crash.

q. The Engine & Propeller:

(1) One blade of the propeller was folded back under the engine, whereas the other three blades were above the surface of the ground. The three above ground level did not indicate high power settings on impact, and had been snapped to a "feathered" position. All blades were loose in the hub.

(2) The engine was badly mangled and cleaned off approximately flush with the nose section. The parts found under the engine did not indicate fire in the air. These were the fuel and oil strainers some parts of cylinder walls and the dump valve.

(3) The generator blast tube and parts of the accessory section cowl did not indicate fire in the air. These parts were also found in the hole made by the engine.

(4) A close examination indicated that the only fire in the engine section was in the carburetor itself and strongly indicated that this was after impact.

(5) The oil cooler assembly was found in the aft end of the hole and showed no signs of burning in the air and though it was split and shattered did not burn too badly after impact even though there was still a good quantity of oil remaining in it.

32. ANALYSIS:

Due to the almost complete disintegration of the aircraft, and the conflicting statements of witnesses, it seems to be impossible to properly analyze this accident. However, it can reasonably be assumed that the pilot lost control of the aircraft in an attempt to recover from a dive and made contact with the ground at high speed in a very steep, nose down, right wing down attitude on a heading of approximately 240°. This heading is approximately 180° from the heading the aircraft was on when first seen by the witnesses. This information along with the general pattern of the wreckage indicates that the aircraft entered an accelerated stall with the right wing down and began to roll and change course to the right from an attitude too low to allow the pilot to effect a recovery.

There is also the possibility that control was lost due to fire. This would tend to be proven by the statements of the witnesses, however no attempt was made to abandon the aircraft as is evidenced from the investigation.

It was further determined from the investigation that the fire occurred after impact, rather than in the air as some of the witnesses stated.

The smoke that was reported by the witnesses was deemed normal from the engine in a dive at the probable speed, and was also caused by condensation trails. It was further determined that the fire reported was torching from the stacks after the pilot encountered difficulty and made a rapid reduction in throttle setting.

33. CONCLUSIONS AND RECOMMENDATIONS:

a. (1) After thorough examination of all the evidence available, including the statements of witnesses, it was determined that the primary cause of this accident was an accelerated stall in a right wing down condition while attempting recovery from a dive of approximately 40 or 45 degrees.

(2) The inspection and analysis report from O&R, NAS, North Island is not available at this time. Should this report include any pertinent information, it will be compiled and forwarded as an addendum to this report.

b. In view of the foregoing it is recommended that all operating commands continually stress the accelerated stall characteristics of this aircraft to all pilots.

Statement of (b) (6) C/I/O, USMC, Engineering Officer, concerning
AD-5 Bureau Number 132397

AD-5, Bureau Number 132397, had been an exceptionally good aircraft, giving very little trouble. Pilots that flew the aircraft on its last nine flights considered it to be a good aircraft. There have been minor troubles from time to time, and in each case they were corrected prior to the next flight. All safety of flight and special inspections had been made, changes and bulletins were up to date with the exception of ComAirPac AD Technical Bulletin 14-55 which would have been accomplished at the next inspection, it having been received on 10 February 1956.

It is my belief that this plane was as near perfect mechanically as it is possible to have an:

(b) (6)



29

21 February 1956

STATEMENT OF MR. W.M. B. NICHOLS, BOX 32, JULIAN, CALIF.

I was standing about one-quarter mile from the scene of the crash. I first noticed the plane coming over the mountains to the west. The plane was coming from the southwest and was on a north-east course. There were no clouds east of the mountain ridge, but there was broken sky coverage west of the ridge. The plane was not too high over the ridge when it came. The motor missed a few times over the mountains. I noticed a vapor trail coming out of the engine and extending all the way to the tail. After the plane came over the ridge it appeared to go into a slip or a bank to the left. At about four hundred to five hundred feet above the ground the engine and the cockpit broke out in flames. The plane immediately dove straight in. The landing gear was retracted. There was no explosion in the air. The canopy was still on as I saw the sun reflection from it. The occupants made no apparent attempt to jump. There was no loud roaring motor noise after the flames broke out. I went straight to the scene of the crash by car and found both boys dead. There was (b) (6) [REDACTED]. There were no flames in the area where I found (b) (6) [REDACTED]. I was a pilot in the USAFR in 1930 and have done private flying since then.

MR. W.M. B. NICHOLS

30

21 February 1956

STATEMENT OF MR. ALBIN J. MARCY, SANTA YSABEL, CALIF.

I was working at the same spot as Mr. Wm. E. NICHOLS. My statement is the same as his. I have had no aviation experience.

MR. ALBIN J. MARCY

31

21 February 1956

STATEMENT OF MRS. LAITLAND MARTINEZ, GEN. DEL., BORREGO SPRINGS,
CALIF.

I didn't see the plane in the air as I was inside my house, but I did notice that the engine was missing or sputtering before impact. It sounded as if the pilot was working the throttle back and forth or turning the switch on and off. I have been taking private flying lessons.

MRS. LAITLAND MARTINEZ

32

20 February 1956

STATEMENT OF MRS. RUTH MERCER, BORREGO SPRINGS, CALIF.

I was in my back yard about one and one-half miles northeast of the crash. I first heard a plane close by and looked up for it. I saw white smoke coming from the plane. It was about one thousand to fifteen hundred feet over the mountain when I first saw it. I didn't notice any backfiring or engine missing. I didn't see anything fall from the plane in the air. The plane was in a dive coming over the mountain. Then it dove straight in. I seem to recall flames on the plane just before the crash, but I am not positive. The weather was clear. I have ridden in planes quite extensively doing bush flying in Alaska.

MRS. RUTH MERCER

33

20 February 1956

STATEMENT OF MRS. JOSEPH STRACHAN, AT EADE MOTEL, BORREGO SPRINGS,
CALIFORNIA

At about 1120 A.M. I was standing in front of my motel water-ing the flowers when I heard an airplane. I looked up and saw a dark plane come from the back of my motel going toward the moun-tains. The plane was flying in a westerly direction. I watched it straight and level for a little time and then went down very steep-ly into the ground. It blew up immediately. I saw no smoke or flame while the plane was flying. I have no aviation experience but have awatched many planes in the air.

MRS. JOSEPH STRACHAN

34

19 February 1956

STATEMENT OF MR. HENRY A. BARLING, BOX 181, BORREGO SPRINGS, CALIF.

I have had no experience in aviation. I saw the crash from a distance of about one-half mile northeast. When I first saw the plane it was in a forty-five degree dive and was above broken clouds which were about forty-five hundred to five thousand feet. It was coming from the west and streaming black smoke. I saw a part fly off the plane in the air. The plane came thru the clouds and seemed to make a partial recovery from the dive, but then steepened to ninety degrees or more just before it crashed and exploded on impact. I looked at my watch and the time was 1122 A.M.. I arrived at the scene of the accident in about five minutes.

MR. HENRY A. BARLING

35

19 February 1956

STATEMENT OF MRS. J. R. RAYMER, BOX 222, BORREGO SPRINGS, CALIF.

I first heard a loud roar of the engine. The plane was below the clouds by the time I saw it, and it was going almost straight down. The cloud layer was broken. I was approximately two miles northeast of the crash. I didn't see any smoke in the air, nor any explosion prior to impact. I didn't see any parts come off in the air. At about five to seven hundred feet I saw bright flames coming out of the engine. There was no apparent effort to pull out of the dive. The dive angle was about seventy to ninety degrees. My husband owns a plane and I fly with him quite a bit.

MRS. J. R. RAYMER

36

20 February 1956

STATEMENT OF MR. TONY WOODS, BORREGO SPRINGS, CALIF.

I first noticed a loud roar and then saw the plane about one thousand feet above the mountain. There were broken clouds to the west of the mountain and clear to the east. He rolled over on his back from a nose high position and went straight down. There was no attempt to pull out. I saw white smoke coming from the plane before going into the dive and it looked like a jet vapor trail. It looked like it was coming from the engine. The plane went out of sight behind a hill and I didn't see it crash. I have had no flying experience.

MR. TONY WOODS

37

19 February 1956

STATEMENT OF MR. EVOY J. LARSON, 8978 NATIONAL BLVD., LOS ANGELES
34, CALIF.

I first heard the plane while it was above the clouds. There were a few holes in the clouds. The clouds were about four to five thousand feet. It was a continuous roar like it was at full throttle. I saw the plane come thru the clouds almost straight down. In fact it looked like it was almost in an outside loop. I saw no parts come off in the air. I saw no smoke in the air. I lost sight of the plane behind a hill and didn't see the crash but heard the explosion. I didn't notice any attempt to pull out. I have had no aviation experience.

MR. EVOY J. LARSON

38

Statement of 1stLt. [REDACTED] (b) (6)
1stLt. R. C. FARLEY (b) (6) USMCR in the case of
USMCR deceased

1stLt. FARLEY joined this organization on 10 February 1956. I helped check this man in and gave him the required tests and handbook for the AD-5. I gave him a brief cockpit check-out on 10 February 1956.

He passed the following tests which I graded: Local Flying Rules, CAR-60, Station Operations Manual, Current Free Area and ADIZ procedures, OPNAV 3700 Flight exam, and safety of Flight exam. He took the AD-5 exam and failed it, after which I went over it completely with him and then made him take this exam a second time. On his second try he passed this exam. In addition to these tests I briefed him fully on the emergency procedures applicable to the AD-5. In addition I spent approximately three to four hours talking to him about the AD-5, asking him questions which he answered satisfactorily. I let him ask any questions he wanted and answered them for him.

On 16 February 1956 I gave him an area check-out in the air in which Lieutenant FARLEY was a passenger. At the same time I gave him another cockpit check and he seemed familiar enough with it, having had over 400 hours in AD type aircraft. He seemed confident enough in his ability to fly the AD-5.

It was my personal feeling that Lieutenant FARLEY was qualified to fly the AD-5.

(b) (6)

[REDACTED]

Statement of First Lieutenant (b) (6)
USMC, concerning AD-5, Bureau Number 132397.

On 17 February, I had occasion to fly an AD-5, Bureau number 132397, side number Z-1, during the hours 1515 to 1715.

The following is a resume of what occurred during the flight.

A normal pre-flight check was executed showing no discrepancies except that the dive brake circuit breaker was pulled, at which time at pilots discretion, the breaker was left disconnected. A normal start, taxi, run-up (guages all reading normal), normal take-off, and climb-out. Path of flight was to Riverside, Mount Palomar, El Centro, San Diego, Long Beach, Los Angeles, and El Toro. Upon arrival at El Toro, Three (3) touch and go landings were made, utilizing full power for take-off. At no time during the flight was anything wrong with engine or airframe.

Manuevers consisted of the following:

1. Banks not exceeding 90 degrees.
2. Dives not exceeding 250 Kts I.A.S.

No aerobatics were executed due to passengers in rear compartment.

The above is true and correct to my knowledge.

(b) (6)

1stLt

USMC

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**IDENTIFICATION LIST OF PARTS AND PHOTOGRAPHS FOR AAR 2-56 AD-5,
BUNO 132397 PILOT FARLEY ACCIDENT OCCURRING 18 FEBRUARY 1956**

1. POINT OF INITIAL CONTACT

An elongated hole approximately five feet long, three feet wide and two feet deep, the length of which was on a NE/SW axis. This area evidences explosion and contained mangled and burned parts of the Right External Tank.

2. SECOND POINT OF IMPACT

Contained the following parts: Engine, propeller, accessory cowling, cowl flaps, heater duct and belly armor plates.

3. THIRD POINT OF IMPACT

This area, the largest of the three, was approximately thirty feet long, fifteen feet wide and four feet deep, the length of which was on a North/South axis. This area was twenty five feet from point of initial contact. The majority of parts located in this area were in such small pieces as to be difficult to recognize. The parts located in the right side of this area were predominantly from the right side of the aircraft. The following parts were identified out of impact area #3:

PART

PART	CONDITION
a. Right Landing Strut and Gear Assembly	Slightly Damaged
b. Wing Fold Cylinder	Slightly Damaged
c. Right Instrument Panel	Mangled
d. Center Line Bomb Ejector	Good
e. Accumulator	Good
f. Armor Plate	Good
g. Bomb Rack (Left)	Good
h. Aileron Power Boost	Good
i. Unidentifiable pieces of metal and tubing.	Slightly Damaged

4. PILOTS BODY

Located approximately twenty four feet from and in line with position #2 (Engine and Propeller).

5. PASSENGERS BODY

Located approximately thirty feet from and in line with position #2 (Engine and Propeller).

The following parts found within a radius of two hundred feet showed the greatest variance of conditions:

PART

PART	LOCATION (Rel to Pos#2)	CONDITION
6. Rudder	15 feet	Fwd edge
7. Right Elevator	38 feet	mangled
8. Vertical Stabilizer	5 feet	Mangled & Burned
9. Bottom Fairing Cone	55 feet	Fwd edge
10. Tail Hook	20 feet	mangled
11. Left Landing Strut	17 feet	Right side
12. a. Fuselage Structure, control cables, radio gear b. Left External Tank	40 feet	Buckled
	40 feet	Good
		Mangled and Burned
		Mangled and Burned
		Intact except for hole in nose

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9. All sections attached to cables were strung out in a south-westerly direction indicating general movement of aircraft. (See Photo #5).

13. Left Wing

70 feet

Was intact

except for apparent impact damage to top of wing (See Photos #9 and #10).

14. Right Aileron

95 feet

Slightly Damaged

<u>PART</u>	<u>LOCATION</u>	<u>CONDITION</u>
15. Right Horizontal Stabilizer	180 feet	Leading Edge Crushed
16. Right Wing Tip	120 feet	Crushed front and bottom
17. Right Wing Center Panel	130 feet	Mangled
18. Right Flap	95 feet	Left leading edge crushed
19. Piece of fuselage Panel (Right Side)	47 feet	Lower half heavily burned (Photo #14)
20. Fuselage Panel (Batt. Acces)	125 feet	Burned externally
21. Right Inboard Wing Walk	120 feet	Burned, leading edge crush- ed (Photo #13)
22. Right Wing Leading Edge	127 feet	Entire section shows burn- ing on side nearest fusel- age (Photo #15)
23. Forward Section of Right External Tank	93 feet	Slightly damaged

The following small parts were found in a radius up to 400 feet and showed the least variance of conditions. They are listed primarily to indicate the overall direction and pattern of parts.

- | | |
|----------------------------------|----------------------------------|
| 24. Insulation Metal | 37. Access Door Parts |
| 25. Parachute "D" Ring | 38. Left Wing Aileron Parts |
| 26. Part of Main Fuel Cell | 39. Part of Term Panel #34 |
| 27. Air Intake Vent | 40. Left Side Fuselage Panel |
| 28. Parts Main Fuel Cell | 41. Metal Casting Parts |
| 29. Access Door, Pilots | 42. Tubing Pieces |
| 30. Wheel Rim | 43. Cowling Pieces |
| 31. Hell Hole Door | 44. Access Cowling Armor Plate |
| 32. Fuselage Parts (Left) | 45. Left Elevator |
| 33. Left Wing Walk | 46. Parts of Right External Tank |
| 34. Intake Ducts | 47. Oil Cooler Scoop Fairing |
| 35. Central Surface Parts | 48. Left Wing Tip |
| 36. Left Wing Gun Access
Door | |









5







8



9

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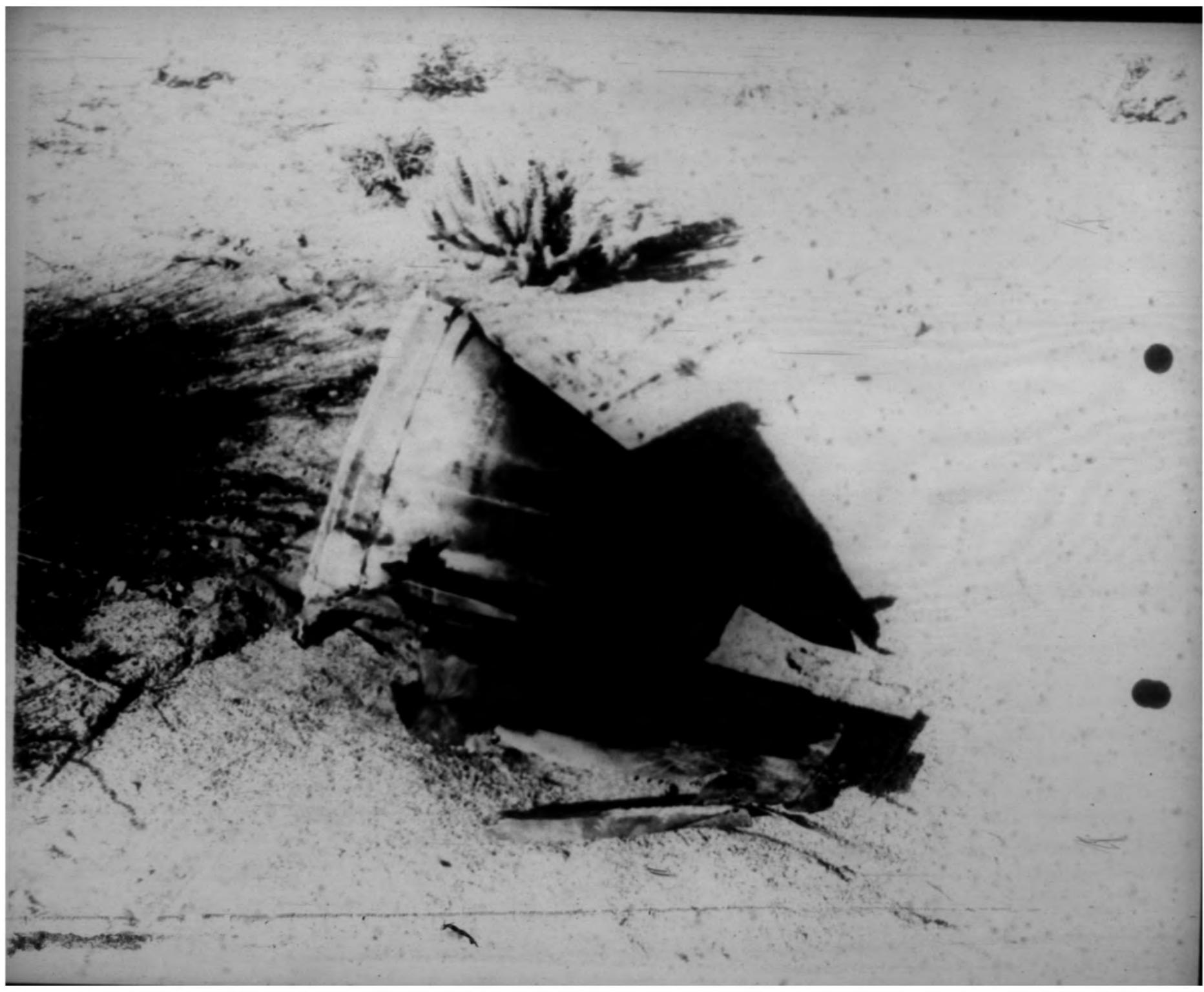


53









15



16



Encl. H 29

6C

Diagram 1



1-Point of initial
Contact

2-2nd point of
Impact

3-3rd point of
Impact

4-Pilots body

5-Pass. body

○ → Photo & Direction

+ - position of part

Radial Dist from
point No 2

Area Elevation
930 ft.

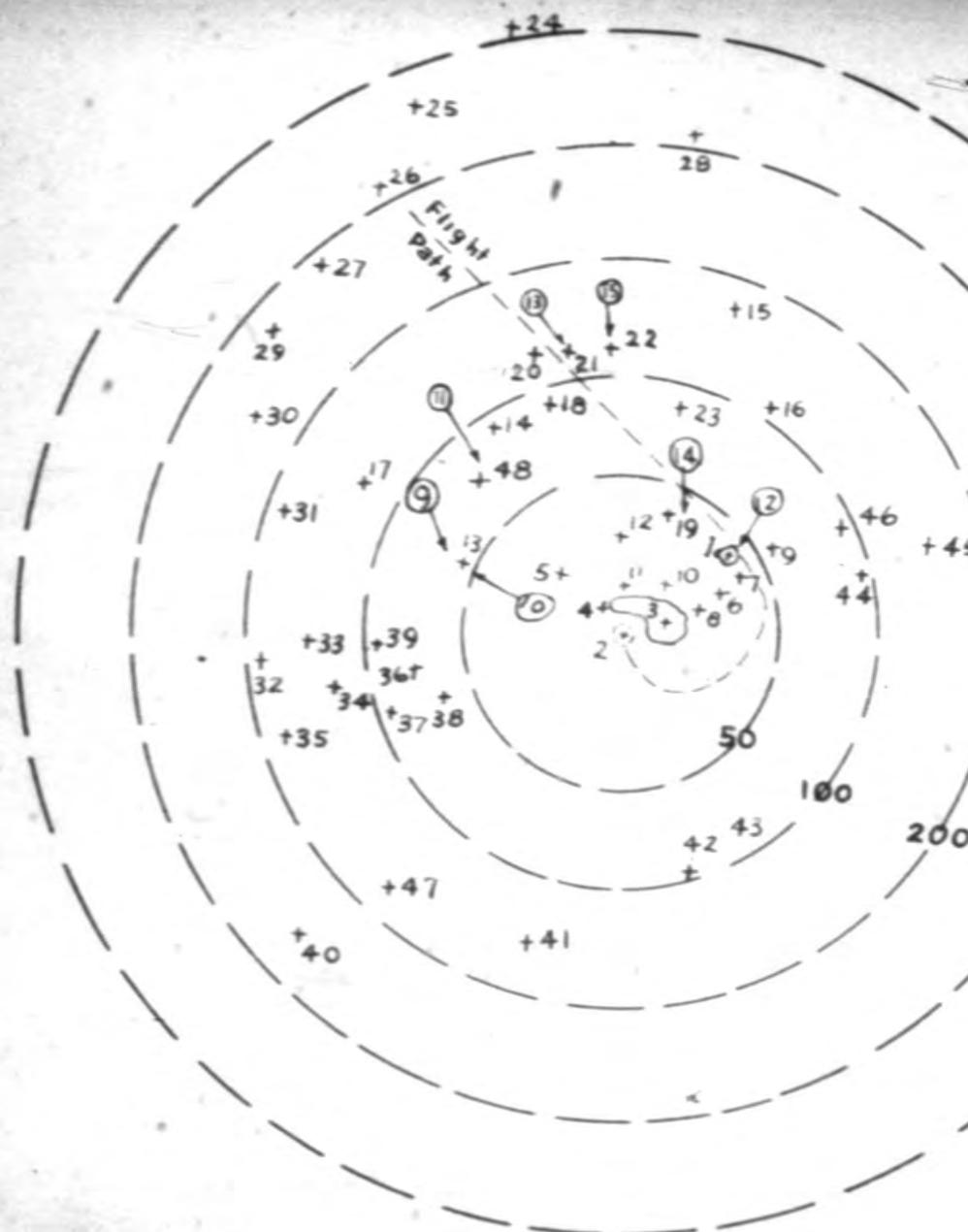
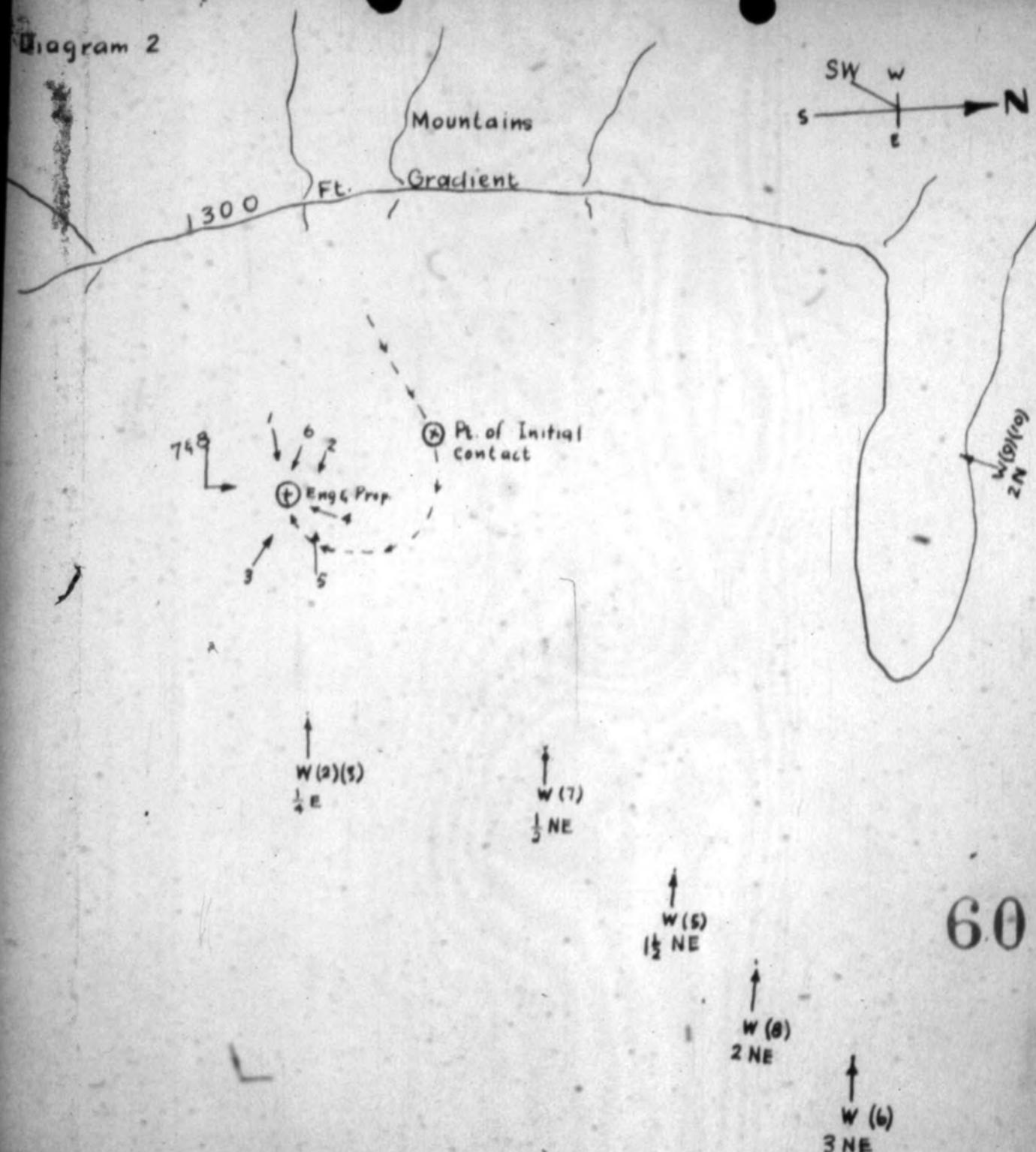


Diagram 2



W (1)(2) - Witness Pos. & Encl. No.
Sighting Distance

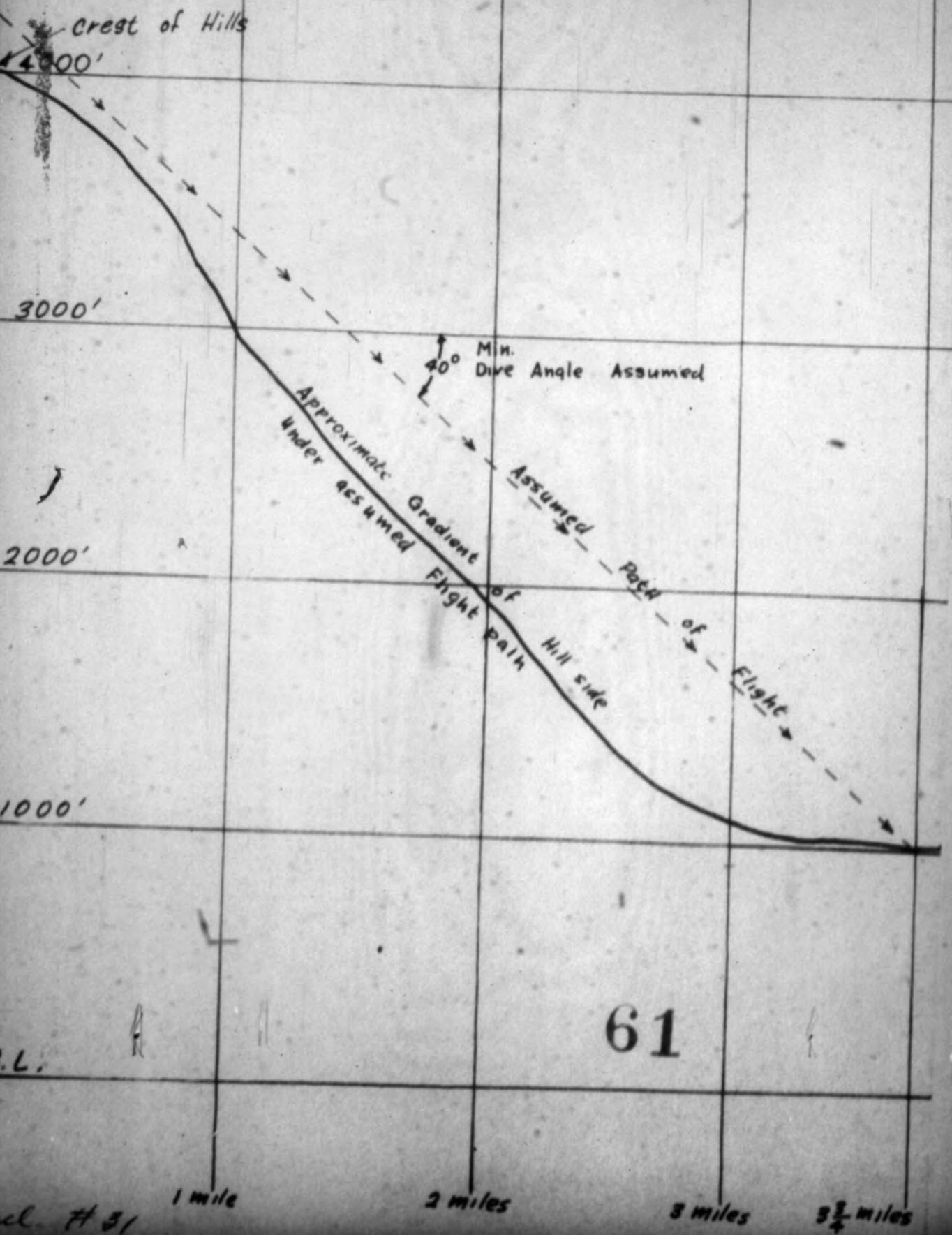
→ - Photo - Direction

↖ - Aerial Photo

- → - Flight Path

Encl. H 30

Diagram 3



WEATHER REPORT

The following weather sequences of the two stations east of the mountains nearest the crash sight were obtained from the Aerology Office, MCAS El Toro.

EL CENTRO:

18Feb56 1130P Garbled

18Feb56 1230P Estimated 6500 broken, 10000 broken, 20000 broken, visibility 20 miles, pressure 1013.2 millibars (29.92 in.), temperature 60°, dew point 35, wind west south west 10, Pilot report base 6500, tops 9000.

THERMAL:

18Feb56 1130P 20000 thin scattered, visibility 15 miles, pressure 1014.2 millibars (29.95 in), temperature 61, dew point 29, winds calm, altimeter setting 29.94 inches.

18Feb56 1230P 8000 thin scattered, 20000 thin broken, visibility 20 miles, pressure 1013.5 millibars (29.93 in.), temperature 61, dew point 26, wind south south east 7, altimeter setting 29.92, contrails.